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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/678,609	10/04/2000	HIROKAZU HONDA	PF-2683/NEC/US/mh	7187
466	7590	01/10/2006	EXAMINER	
YOUNG & THOMPSON 745 SOUTH 23RD STREET 2ND FLOOR ARLINGTON, VA 22202			GRAYBILL, DAVID E	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

5/2

Office Action Summary	Application No. 09/678,609	Applicant(s) HONDA, HIROKAZU	
	Examiner David E. Graybill	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 43, 45-54 and 86-89 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 86-89 is/are allowed.
- 6) ☒ Claim(s) 43 and 45-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10-24-5 has been entered.

In the rejections *infra*, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 43, 45 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakamura (6372547), Hayasaka (6809421) and Baba (6016013).

At column 5, line 55 to column 8, line 9; and column 10, line 49 to column 12, line 35, Nakamura discloses a semiconductor device comprising: an interconnection board 3 having first and second surfaces; at least one external electrode pad 11 buried in said interconnection board, said at least one external electrode pad having an exposed surface level with said second

surface so that said second surface and said exposed surface form a single flat plane; a buffer layer 20, 24 having a first surface contacting said second surface of said interconnection board; a supporting plate 55 spaced from a second surface of said buffer layer and defining a gap between said second surface of said buffer layer and said supporting plate, said supporting plate having plural holes therein "hole portions"; at least one external electrode 54 in one of said holes in said supporting plate and connected to said at least one external electrode pad through said buffer layer; and a sealing resin 50 in said gap and surrounding and supporting said at least one external electrode; wherein said external electrode comprises a solder ball.

To further clarify the disclosure of a buffer layer 20, 24 and a supporting plate 55, the terms "buffer" and "supporting" are statements of intended use of the layer and plate, respectively, that do not appear to result in a structural difference between the claimed layer and plate and the layer and plate of Nakamura. Further, because the layer and plate of Nakamura appear to have the same structure as the claimed layer and plate, they appear to be inherently capable of being used for the intended uses – specifically, for buffering and supporting, respectively, and the statements of intended use do not patentably distinguish the claimed layer and plate from the layer and plate of Nakamura. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl

10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). And, claims directed to product must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does [or is intended to do]." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

Also, Nakamura discloses that the external electrode 54 comprises a solder ball because Nakamura discloses, at least in the cited Figures 6B, 6C, 6D and 7, that the external electrode comprises a round or roundish, cylindrical solder body.

However, Nakamura does not appear to explicitly disclose said interconnection board having a multilevel insulating resin layer and a multilayer wiring layer therein; at least a semiconductor chip mounted on said first surface of said interconnection board; wherein said at least semiconductor chip is bonded via bumps to said first surface of said interconnection board.

Notwithstanding, at column 13, lines 1-19; and column 18, lines 23-37, Hayasaka discloses an interconnection board 1a having a multilevel insulating layer 11n and a multilayer wiring layer 19a, 19b therein; at least a

semiconductor chip 1b mounted on said first surface of said interconnection board; wherein said at least semiconductor chip is bonded via bumps 8 to said first surface of said interconnection board. Moreover, it would have been obvious to combine these disclosures of Hayasaka and Nakamura because it would provide a stacked chip package having reduced size and increased reliability.

Also, Nakamura and Hayasaka do not appear to explicitly disclose a resin insulating layer.

Still, at column 4, line 27, Baba discloses a resin insulating layer 4a. In addition, it would have been obvious to combine this disclosure of Baba with the disclosure of Nakamura and Hayasaka because it would facilitate provision of the insulating layer of Nakamura and Hayasaka.

Claims 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura, Hayasaka and Baba as applied to claim 43, and further in combination with Nakatani (6038133).

As cited, Nakamura, Hayasaka and Baba disclose a sealing material "underfill" provided on said first surface of said interconnection board for sealing said at least semiconductor chip and said bumps; at least a heat spreader 60 provided on said at least semiconductor chip; an under-fill "underfill" material provided on said first surface of said interconnection board for sealing said at least semiconductor chip and said bumps; an

inherent stiffener 20 spaced from at least one peripheral edge of said semiconductor chip; and a heat spreader contacting said semiconductor chip and said stiffener.

To further clarify, the term "heat spreader" is a statement of intended use of the product that does not appear to result in a structural difference between the claimed product and the product of the applied prior art. Further, because the product of the applied prior art appears to have the same structure as the claimed product, it appears to be inherently capable of being used for the intended use - specifically, for spreading heat - and the statement of intended use does not patentably distinguish the claimed product from the product of the applied prior art. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, "Expressions relating the apparatus to contents thereof [in the instant case - heat] during an intended operation are of no significance in determining patentability of the apparatus claim."; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, claims directed to product must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is,

not what a device does [or is intended to do]." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). In any case, as cited, Baba explicitly discloses a heat spreader 39, contacting chip 1b. Furthermore, it would have been obvious to combine this disclosure of Baba with the disclosure of Nakayama and Hayasaka because it would enhance heat radiation capability of the device.

However, Nakamura, Hayasaka and Baba do not appear to explicitly disclose a sealing resin material and an under-fill resin material.

Notwithstanding, at column 9, lines 22-31, Nakatani discloses an underfill sealing resin material. Furthermore, it would have been obvious to combine this disclosure of Nakatani with the disclosure of Nakamura, Hayasaka and Baba because it would facilitate provision of the under-fill of Nakamura, Hayasaka and Baba and prevent the formation of gaps.

Claims 50-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura, Hayasaka and Baba as applied to claim 43, and further in combination with Kitazawa (6057600).

As cited *supra*, Nakamura, Hayasaka and Baba disclose wherein said buffer layer comprises plural generally column shaped electrically conductive layers 24 that connect said at least one external electrode to said at least one external electrode pad; and an inherently supporting sealing material 20 surrounding said plural generally column shaped electrically conductive

layers so that said supporting sealing material is in tight contact with said plural generally column shaped electrically conductive layers; wherein said supporting sealing material is inherently capable of absorbing and/or relaxing a stress applied to said at least one external electrode; wherein said plural generally column shaped electrically conductive layers are made of a metal "Cu"; wherein said supporting sealing resin material is made of an insulative material.

However, Nakamura, Hayasaka and Baba does not appear to explicitly disclose a supporting sealing resin material made of an organic insulative material.

Still, as cited supra, Nakamura, Hayasaka and Baba disclose a glass-ceramic supporting sealing material wiring board 20. In addition, at column 11, lines 3-9, Kitazawa discloses that a glass-ceramic wiring board 23 and an organic insulative resin wiring board 23 are alternatives and equivalents; therefore, it would have been obvious to substitute or combine the board of Kitazawa for or with the board of Nakamura, Hayasaka and Baba. See *In re May* (CCPA) 136 USPQ 208 (It is our opinion that the substitution of Wille's type seal for the cement of Hallauer in Figure 1 would be obvious to persons of ordinary skill in the art from the disclosures of these references, merely involving an obvious selection between known alternatives in the art and the application of routine technical skills.); *In re Cornish* (CCPA) 125 USPQ 413;

In re Soucy (CCPA) 153 USPQ 816; *Sabel et al. v. The Wickes Corporation et al.* (DC SC) 175 USPQ 3; *Ex parte Seiko Koko Kabushiki Kaisha Co.* (BdPatApp&Int) 225 USPQ 1260; and *Ex parte Rachlin* (BdPatApp&Int) 151 USPQ 56. See also *Smith v. Hayashi*, 209 USPQ 754 (Bd. of Pat. Inter. 1980) (However, there was evidence that both phthalocyanine and selenium were known photoconductors in the art of electrophotography. "This, in our view, presents strong evidence of obviousness in substituting one for the other in an electrophotographic environment as a photoconductor." 209 USPQ at 759.). An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted). See also *In re Crockett*, 279 F.2d 274, 126 USPQ 186 (CCPA 1960); *Ex parte Quadranti*, 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992).

Claims 86-89 are allowed.

Applicant's remarks filed 10-24-5 have been fully considered and are moot in view of the new grounds of rejection.


The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions relevant to the examination of the instant invention.

For information on the status of this application applicant should check PAIR:

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Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.
The fax phone number for group 2800 is (571) 273-8300.



David E. Graybill
Primary Examiner
Art Unit 2822